

I. Find the exact value using the half-angle formulas.

$$1. \sin 22.5^\circ = \sin\left(\frac{45}{2}\right)$$

$$\sin\left(\frac{45}{2}\right) = + \sqrt{\frac{1 - \cos(45)}{2}}$$

$$= \sqrt{\frac{1 - \frac{\sqrt{2}}{2}}{2}}$$

$$= \frac{\sqrt{2 - \sqrt{2}}}{2}$$

$$2. \cos 75^\circ = \cos\left(\frac{150}{2}\right)$$

$$\cos\left(\frac{150}{2}\right) = + \sqrt{\frac{1 + \cos(150)}{2}}$$

$$= \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}} = \sqrt{\frac{2 - \sqrt{3}}{4}}$$

$$= \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$3. \sin 165^\circ = \sin\left(\frac{330}{2}\right)$$

$$\sin\left(\frac{330}{2}\right) = + \sqrt{\frac{1 - \cos(330)}{2}}$$

$$= \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$

$$= \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$4. \cos 67.5^\circ = \cos\left(\frac{135}{2}\right)$$

$$\cos\left(\frac{135}{2}\right) = + \sqrt{\frac{1 + \cos(135)}{2}}$$

$$= + \sqrt{\frac{1 - \frac{\sqrt{2}}{2}}{2}}$$

$$= \frac{\sqrt{2 - \sqrt{2}}}{2}$$

$$5. \cos 105^\circ = \cos\left(\frac{210}{2}\right)$$

$$= - \sqrt{\frac{1 + \cos(210)}{2}}$$

$$= - \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$

$$= - \frac{\sqrt{2 - \sqrt{3}}}{2}$$

$$6. \sin 15^\circ = \sin\left(\frac{30}{2}\right)$$

$$\sin\left(\frac{30}{2}\right) = + \sqrt{\frac{1 - \cos(30)}{2}}$$

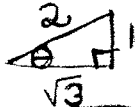
$$= \sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$

$$= \frac{\sqrt{2 - \sqrt{3}}}{2}$$

II. Solve the equation for  $0^\circ \leq \theta < 360^\circ$  UNIT CIRCLE

$$1. \cos \theta = \frac{1}{2} \text{ unit circle } x = \frac{1}{2}$$

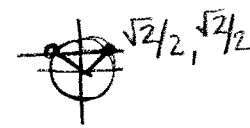
$$\theta = 60^\circ \text{ and } 300^\circ$$

$$2. \tan \theta = \frac{1}{\sqrt{3}}$$



$$\theta = 30^\circ \text{ and } 210^\circ$$

$$3. \sin \theta = -\frac{1}{2} \text{ } y = -\frac{1}{2}$$

$$\theta = 330^\circ \text{ and } 210^\circ$$

$$4. \sin \theta = \frac{\sqrt{2}}{2}$$


$$\theta = 45^\circ \text{ and } 135^\circ$$

$$5. \cos \theta = \pm \frac{1}{2}$$



$$\theta = 60^\circ, 120^\circ, 240^\circ, 300^\circ$$

$$\sin \theta = \cos$$

$$6. \tan \theta = \pm 1$$


$$\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

III. Use a calculator to solve for  $0^\circ \leq \theta < 360^\circ$ . (nearest degree)

$$1. \sin \theta = .4$$


$$\theta = \sin^{-1}(.4)$$

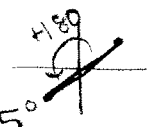
$$\theta = 24^\circ, 156^\circ$$

$$2. \cos \theta = -.72$$


$$\cos^{-1}(-.72) = 136$$

$$\theta = 136^\circ \text{ and } 224^\circ$$


$$360 - 136 = 224$$

$$3. \tan \theta = .475$$


$$\theta = \tan^{-1}(.475) = 25^\circ$$

$$\theta = 25^\circ \text{ and } 205^\circ$$

$$25 + 180 =$$


$$4. \sin \theta = \pm .641$$


$$\theta = \sin^{-1}(.641) = 40^\circ$$

$$360 - 40^\circ = 320^\circ \quad 180 + 40 = 220^\circ$$

$$180 - 40 = 140^\circ$$

$$\theta = 40^\circ, 140^\circ, 220^\circ, 320^\circ$$


$$5. \tan \theta = -2.8$$


$$\theta = \tan^{-1}(-2.8) = -70^\circ$$

$$360 - 70 = 290$$

$$\theta = 290^\circ \text{ and } 110^\circ$$

$$290 - 180 = 110$$

$$6. \cos \theta = .215$$


$$\theta = \cos^{-1}(.215) = 78^\circ$$

$$360 - 78 = 282$$

$$\theta = 78^\circ \text{ and } 282^\circ$$

